Response under 37 C.F.R. 1.116
- Expedited Examining Procedure -
Examining Group 2871

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Michael R. Brickey, et al

MICROVOIDED LIGHT DIFFUSER

Serial No. 10/017,402

Filed 14 December 2001

Group Art Unit: 2871

Examiner: George Y. Wang

I hereby certify that this correspondence is being deposited today with the United States Postal Service as first class mail in an envelope addressed to Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Deidra L. Mack
Deidra L. Mack

Date July 1, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

DECLARATION UNDER RULE 132

The undersigned, Cheryl J. Brickey (nee Kaminsky), declares that:

She is an inventor in the above-captioned patent application;

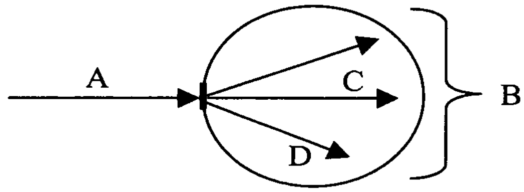
She has received the degree of B.S. in Chemical Engineering from Carnegie Mellon University;

She has been employed as a research scientist with Eastman Kodak Company since August 2000;

She has reviewed the outstanding Office Action and any applicable cited references;

As one skilled in the art, she has been asked to help clarify the technical distinctions between the terms used in the present claims and the teachings of Ouderkirk et al. This has been done by using diagrams and hypothetical optical elements, with reference to the specification where appropriate, to demonstrate the distinctions, as follows:

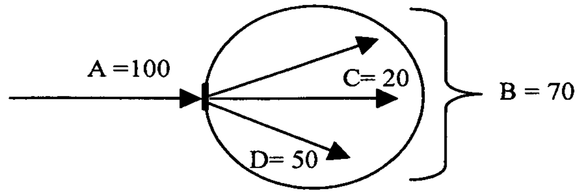
Table I - Optical Transmission Properties Defined



B=C+D

Percent total transmission	Total light exiting film / Total light entering the film ***B/A*** *"Percentage total transmitted light refers to percent of light that is transmitted though the sample at all angles." Page 27, lines 11-12.*
Percent diffuse transmission	Total light exiting diffusely / Total light entering the film <u>D/A</u> *"Diffuse transmittance is defined as the percent of light passing though the sample excluding a 2 degree angle from the incident light angle." Page 27 lines 12-14*
Percent specular transmission	Total light exiting specularly / Total light entering the film <u>C/A</u> *"specular light (within 2 degrees of incident angle of light)." Page 33, lines 14-15*
Diffuse light transmission efficiency	Total light exiting diffusely / Total light exiting the film <u>D/B</u> *"The term "diffuse light transmission efficiency" means the ratio of % diffuse transmitted light at 500 nm to % total transmitted light at 500 nm multiplied by a factor of 100." Page 5, lines 22-24*

Example 1 – Optical Transmission Example

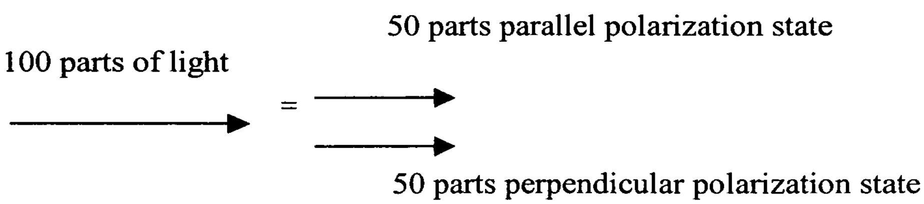


Percent total transmission	Total light exiting film / Total light entering the film ***B/A= 70/100 = .7 or 70%***
Percent diffuse transmission	Total light exiting diffusely / Total light entering the film D/A=50/100 = .5 or 50%
Percent specular transmission	Total light exiting specularly / Total light entering the film C/A= 20/100 = 0.2 or 20%
Diffuse light transmission efficiency	Total light exiting diffusely / Total light exiting the film D/B= 50/70 = .714 or 71.4%

As one can see from the above numbers, percent diffuse transmission and diffuse light transmission efficiency are two very different numbers and cannot be compared to one another. On the other hand, when one skilled in the art uses the term "light transmission" without further limitation, it is well understood to those skilled in the art to mean the percentage total transmission.

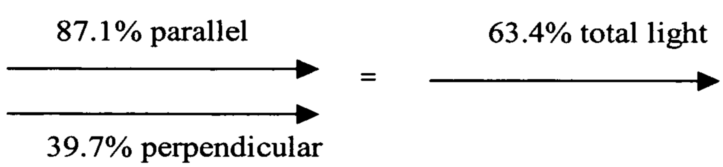
Polarized Light Measurements

Light is made up of two polarization states of light. They are referred to as p and s, or parallel and perpendicular, or 1 and 2, etc. For this explanation, we will refer to the two as para and perp. Light is typically made up of approximately equal parts perp and para polarized light.



Example 2- Polarized Light

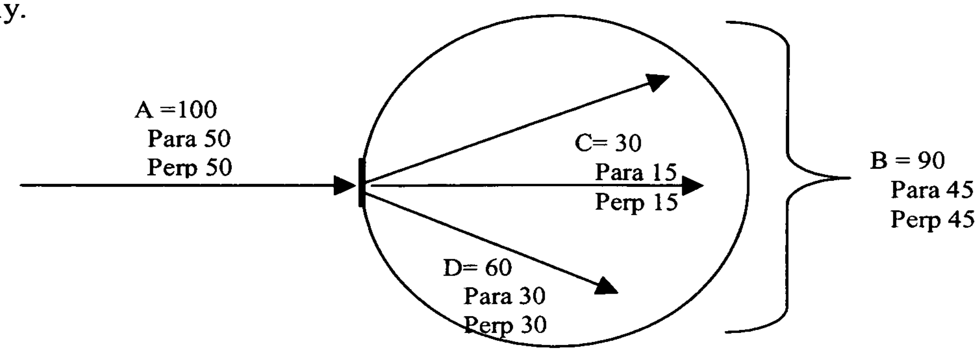
Example 101 in Ouderkirk states that the transmission was 87.1 for the parallel and 39.7% for the perpendicularly polarized light, respectively.



Based on each entering component comprising 50%, this indicates that the total transmission for example 101 in Ouderkirk is 63.4% (0.5x87.1+0.5x39.7 = 63.4%)

Example 3 - Polarization + Optical Properties

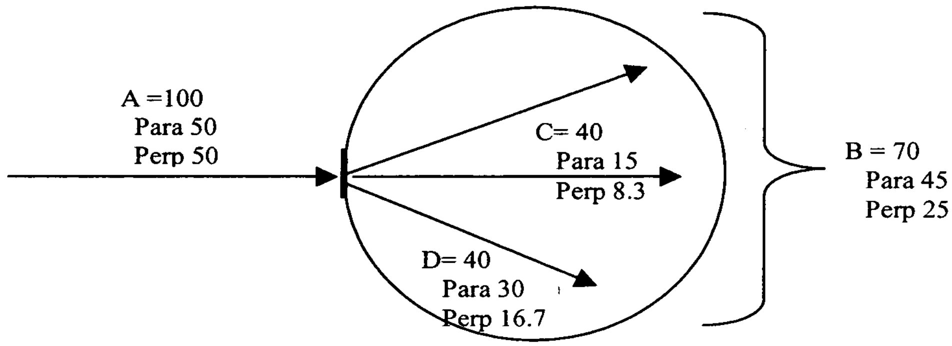
This hypothetical example is of a film that does not alter the polarization properties of the incoming light. Therefore the film transmits light of each polarizartion equally.



Percent total transmission	**Total light exiting film / Total light entering the film** B/A= 90/100 = .9 or 90%
Percent parallel transmission	*Total parallel light exiting film / Total parallel light entering film* B_{para}/A_{para} = 45/50 = .9 or 90%
Percent perpendicular transmission	*Total perpendicular light exiting film / Total perpendicular light entering film* B_{perp}/A_{perp} = 45/50 = .9 or 90%
Percent diffuse transmission	**Total light exiting diffusely / Total light entering the film** ***D/A=60/100 = .6 or 60%***
Percent parallel diffuse transmission	*Total parallel light exiting diffusely / Total parallel light entering film* D_{para}/A_{para} = 30/50 = .6 or 60%
Percent perpendicular diffuse transmission	*Total parallel light exiting diffusely / Total perp light entering film* D_{para}/A_{para} = 30/50 = .6 or 60%
Percent specular transmission	**Total light exiting specularly / Total light entering the film** ***C/A= 30/100 = 0.3 or 30%***
Percent parallel specular transmission	*Total parallel light exiting specularly / Total parallel light entering film* C_{para}/A_{para} = 15/50 = .3 or 30%
Percent perpendicular specular transmission	*Total parallel light exiting specularly / Total perp light entering film* C_{para}/A_{para} = 15/50 = .3 or 30%
Diffuse light transmission efficiency	**Total light exiting diffusely / Total light exiting the film** ***D/B= 60/90 = .667 or 66.7%***
Parallel diffuse light transmission efficiency	*Total para light exiting diffusely / Total para light exiting the film* ***D/B= 30/45 = .667 or 66.7%***
Perpendicular diffuse light transmission efficiency	*Total perp light exiting diffusely / Total perp light exiting the film* ***D/B= 30/45 = .667 or 66.7%***

Example 4 - Polarization + Optical Properties

This example is of a film that does alter the polarization properties of the incoming light. Therefore the film does not transmit light of each polarizartion equally. An example of this type of film would be a reflective polarizer.



Percent total transmission	**Total light exiting film / Total light entering the film** B/A= 70/100 = .7 or 70%
Percent parallel transmission	*Total parallel light exiting film / Total parallel light entering film* B_{para}/A_{para} = 45/50 = .9 or 90%
Percent perpendicular transmission	*Total perpendicular light exiting film / Total perpendicular light entering film* B_{perp}/A_{perp} = 25/50 = .5 or 50%
Percent diffuse transmission	**Total light exiting diffusely / Total light entering the film** ***D/A=40/100 = .4 or 40%***
Percent parallel diffuse transmission	*Total parallel light exiting diffusely / Total parallel light entering film* D_{para}/A_{para} = 30/50 = .6 or 60%
Percent perpendicular diffuse transmission	*Total parallel light exiting diffusely / Total perp light entering film* D_{para}/A_{para} = 16.7/50 = .334 or 33.4%
Percent specular transmission	**Total light exiting specularly / Total light entering the film** ***C/A= 40/100 = 0.4 or 40%***
Percent parallel specular transmission	*Total parallel light exiting specularly / Total parallel light entering film* C_{para}/A_{para} = 15/50 = .3 or 30%
Percent perpendicular specular transmission	*Total parallel light exiting specularly / Total perp light entering film* C_{para}/A_{para} = 8.3/50 = .167 or 16.7%
Diffuse light transmission efficiency	**Total light exiting diffusely / Total light exiting the film** ***D/B= 40/70 = .571 or 57.1%***
Parallel diffuse light transmission efficiency	*Total para light exiting diffusely / Total para light exiting the film* ***D/B= 30/45 = .667 or 66.7%***
Perpendicular diffuse light transmission efficiency	*Total perp light exiting diffusely / Total perp light exiting the film* ***D/B= 16.7/25 = .667 or 66.7%***

At page 3 of the Action, the Examiner states that Ouderkirk discloses a light diffuser where the light transmission is greater than 87% (Col 29, lines 8-9). Col 29 lines 8-9 describe the light transmission properties of Example 101 of the reference. "The transmission was 87.1% and 39.7% for parallel and perpendicular polarized light, respectively." Assuming that the entering light is ½ para and ½ perp, (there is no reason to believe otherwise) the total light transmission is:

$$\frac{87.1}{2} + \frac{39.7}{2} = 63.4$$

63.4% total transmission is much lower than Applicants' claimed ranges of greater than 80%(Claim 1) and 87% (Claim 11) total transmission. In fact, in the 124 Examples in Ouderkirk et al., there is not one example that has a higher total transmission than 75.8% (please see Appendix A for calculations on each example).

In the response to Applicants' prior arguments in Paragraph 15 of the Office Action, the Examiner states beginning at the 8th line from the bottom of page 7:

> "Furthermore, Ouderkirk clearly teaches a diffuse light transmission efficiency of at least 65% (Col 32, lines 39-41 and 50-53.)

The section the Examiner quotes reads,

> "The optical body of claim 13, wherein said optical body has a total light transmission of greater than about 70% <u>for said second polarization state</u> of electromagnetic radiation." (emphasis added)

This language in the claim of the reference is only quantifying one of the two polarization states of light meaning that the claim states that the film has at least 35% (70% / 2) total transmission. The second quoted section reads,

> "The optical body of claim 1, wherein at least about 70% of light <u>polarized orthogonal to a first polarization of light</u> is transmitted through said optical body with an angle of deflection of less than about 8°."(emphasis added)

"Light polarized orthogonal to a first polarizer of light" means light that is at a right angle or perpendicular to the first polarization state of light, also known as the second polarization state of light. Furthermore, the quoted claim also states that at least 70% of the light transmitted from this polarization state of light is transmitted with a

deflection angle of less than 8 degrees and would therefore have a lower than the claimed range of greater than 65% percent diffuse transmission efficiency.

The Examiner states:

> "Even if Applicant is correct that 70% transmitted from the first state is actually 35% transmission efficiency, then it would be equally correct to say that another 35% is transmitted through the second polarization state. Therefore, Ouderkirk discloses a diffuser having 'a diffuse light transmission efficiency of at least 65%'".

Applicants respectfully disagree. Firstly, the claims that the Examiner refers to are not directed to the total light transmission percentage. Claims 13, 14, and 15 are directed towards the reflectivity of the first polarization state of light. Claims 13, 16, and 17 are directed towards the transmission of the second polarization state of light. Claims 18, 19, and 20 are directed towards the transmission of light polarized orthogonal to the first polarization state of light which is the second polarization state of light. Therefore, the only transmission is transmission of the second polarization state of light. Furthermore, the claims directed towards the first polarization state of light claim 50%, 60%, and 70% reflectivity (not transmission) corresponding to 50%, 40%, and 30% transmission of the first polarization state of light. Therefore, a film made with these disclosed ranges would not have a total transmission of greater than 80%.

As the advantageous effect of the invention states, Applicant's invention provides improved light transmission while simultaneously diffusing specular light sources. (Page 4, lines 14-16). It is easy to have a film or substrate with high transmission; (an example of this would be a clear pane of glass). The clear pane of glass has a very high level of transmission and a low level of diffusing or haze. On the other extreme, a piece of frosted glass has a very high amount of diffusing or haze and a low amount of transmission. Applicant's invention has combined transmission and diffusion to create a film with high transmission and high diffusion. Ouderkirk discloses 124 preferred embodiment examples quantifying the transmission with transmission in the perp and transmission para polarization states. Assuming that the entering light is ½ perp and ½ para, the total light transmission of the film can be calculated. For the 124 examples, the total transmission ranges from 41.3 to 75.8%. This is significantly lower than the claimed range of Applicant's invention

Further, Ouderkirk et al. discusses the scattering (or diffusing) characteristics when discussing figure 4a.

FIG. 4a is a graph of the bidirectional scatter distribution as a function of scattered angle for an oriented film in accordance with the present invention for light polarized perpendicular to orientation direction;" (Col 3, lines 50-54). Ouderkirk goes on to describe the test method in Col 7 line 65- Col 8 line 5. Ourderkirk states that in figure 4a, "there is a significant specularly transmitted peak with a sizable component of diffusely transmitted light (scattering angle between 8 and 80 degrees) Col 8, lines 9-13.

A re-creation of figure 4a is shown in Appendix B and the same figure is shown in Appendix C with the y-axis having a linear scale. Once the y-axis scale is changed to a linear scale, one can see that almost all of the light exits the film at an angle between 0 and 8 degrees and very little light exits the film at angles from 8 to 80 degrees. The percent diffuse transmission efficiency of this film would be the area under the curve for the ranges of 8-80 degrees divided by the total area under the curve. Once can see that this is not going to be above 65% but would most likely be in the 1-10% range. Therefore, Ouderkirk et al. does not teach films having a light transmission of at least 80% and a percent diffuse transmission efficiency of 65% or greater.

Col 2 lines 61-65 of Ourderkirk et al. teach away from the microvoids having a substantially circular cross-section by stating: "The polymers are selected such that there is low adhesion between the dispersed phase and the surrounding matrix polymer, so that an elliptical void is formed around each inclusion when the film is stretched."

For Example 3, Applicants used an 838 micron first layer and a 51 micrometer thick second layer. The second layer was impregnated with cross-linked polystyrene 20% by weight. The resultant film was stretched 4 times its original size in both directions at 105 degrees Celsius. The resulting percent total transmission was 85.7% and the percent diffuse transmission efficiency was 71.4/85.7 = 83.3%. (page 29 line 22-page 30 line 2 and page 32 Table 1) One would need to employ routine experimentation to adjust the parameters to reach the objective total transmission and percent diffuse transmission efficiency for different polymer systems.

To summarize, Ouderkirk does not disclose a light diffuser that meets the limitations of claim 1 nor any of the other claims of the application.

The undersigned declares further that all statements made herein of the undersigned's own knowledge are true and all statements made on information and belief are believed to be true. These statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Cheryl J. Brickey (nee Kaminsky)

Date: 6/30/05

Encl: Appendices A, B, C

Appendix A

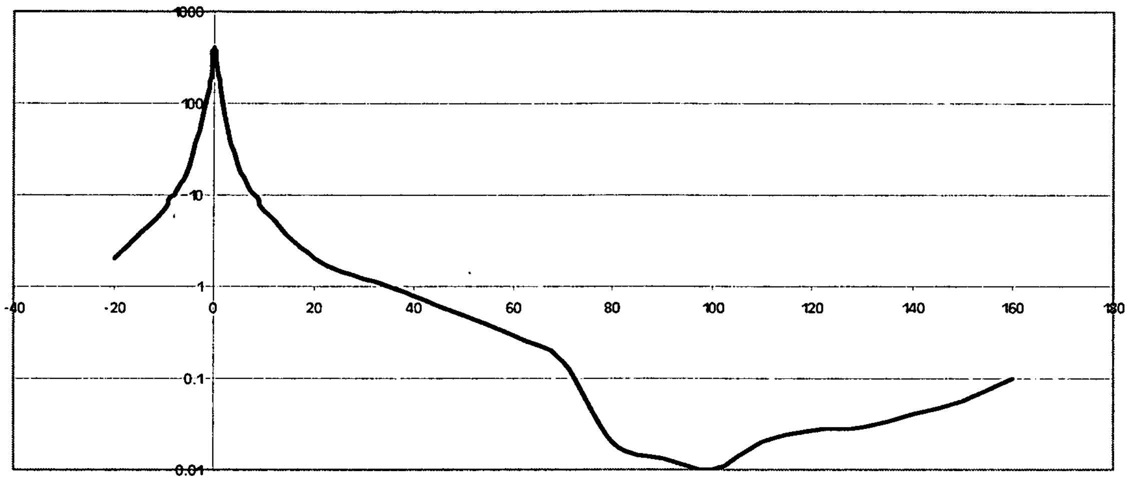
Patent Examples from Ouderkirk et al. (5,825,543)

Example	Para Refl	Perp Refl	Total Refl (calculated)	Para Trans	Perp Trans	**Total Trans (calculated)**
1	75	52	63.5			
2	73.3	35	54.15			
3	81	35.6	58.3			
4	80.1	15	47.55			
5	75.3	22.6	48.95	20.4	76.2	48.3
6	40	19.4	29.7	58.4	80.2	69.3
7	77.3	25.3	51.3	21.8	74.2	48.0
8	55.6	23.8	39.7	41	76	58.5
9	76.2	26.5	51.35	21.2	71.2	46.2
10	49.6	22.4	36	48.9	76.8	62.9
11	67	17.2	42.1	27.6	81.5	54.6
12	71.9	25	48.45	22.1	66.8	44.5
13	73.7	19.3	46.5	20.3	79.5	49.9
14	69.4	32.5	50.95	26.2	66.3	46.3
15	68.7	24.7	46.7	26.2	73	49.6
16	76.1	23.2	49.65	20.6	75.4	48.0
17	67	16.9	41.95	27.3	82.1	54.7
18	80.3	18	49.15	15	80.1	47.6
19	70.7	25.2	47.95	21.6	70.2	45.9
20	70.1	23.4	46.75	28.7	75.8	52.3
21	70.8	19.7	45.25	27.8	79.8	53.8
22	62.6	19.2	40.9	36.7	80.5	58.6
23	76.6	21.8	49.2	21.1	77.2	49.2
24	74	17.3	45.65	17.3	83.7	50.5
25	75.8	18	46.9	16	82.1	49.1
26	73.3	18	45.65	17	84.7	50.9
27	76.3	16.5	46.4	16	83	49.5
28	76	17.5	46.75	17	83.7	50.4
29	na	na	na	na	na	
30-100	no optical data given					
101				39.7	87.1	63.4
102				44.4	87.8	66.1
103				43.5	86.1	64.8
104				43.6	86.5	65.1
105				50.7	88.2	69.5
106				40.7	89.3	65.0
107				42.8	88.5	65.7
108				43.3	88.6	66.0
109				45.7	89.3	67.5
110				41.6	87.8	64.7
111				48.2	88.8	68.5
112				62.8	88.5	75.7

113				59.6	87.1	73.4
114				59.6	86.8	73.2
115				58.3	88	73.2
116				58.7	88	73.4
117				60.6	88.5	74.6
118				57.4	89	73.2
119				64	87.3	75.7
120				65.1	86.5	75.8
121				61.5	88.1	74.8
122				2	83	42.5
123				1.5	81	41.3
124				5	87	46.0

Appendix B

Approximation of Fig 4a, Patent 5,825,543



Appendix C

Approximation of Fig 4a Patent 5,825,543
Y axis in a Linear Scale